CLOSURE FOR A CONTAINER.

The present invention relates in general to an apparatus and in particular to a closure for a container.

Closures for containers are known which have tamper evident and/or tamper proof features. Such features may be provided for safety reasons, for example closures for containers which are used with drugs or harmful substances.

Closures are known which comprise a cap having a retaining ring which is frangibly connected to the cap and disengaged therefrom by unscrewing the cap. For such closures, the force required to disengage the ring from the cap can be variable and may be unacceptably high in some cases. Furthermore, once the cap and ring have been disengaged, the rings of such closures are loose fitting and therefore relatively easy to remove.

US4147268 relates to a pilfer-proof closure for use with containers having a threaded neck and a collar. The closure has a flexible locking member attached to the inside of the closure body by frangible connectors. When the cap is unscrewed from the container, the locking member is broken off from the threaded portion of the closure and left around the neck of the container.

US4805791 relates to a band with lock ring for tamper-evident cap. The band locks with rupturable bridges which hold a tamper-evident band in place such that when the bridges break the lock ring causes the tamper-evident band to drop down on the container neck. In the embodiment shown, the rupturable bridges are broken when the cap is unscrewed from the container.

GB1531783 relates to a safety closure for bottles. The bottles have a neck with an upper portion threaded in one direction and a lower portion of larger diameter than the upper portion, threaded in the opposite direction. When the cap is unscrewed, a safety ring is screwed down on its thread.

US 4099639 relates to a child resistant closure. The closure is used with a container having a neck with an integral yieldable collar. Manual pressure on the collar releases interengaged projection and recess means to enable retrograde movement of the cap from the neck of the container.

US 3884379 relates to a bottle safety closure in which racheting one-way engagement relation which develops between the bottle and cap in the closed position, may be disengaged by finger-actuated axial depression of a projection.

Therefore, there remains a need, for an improved closure for a container.

Thus, according to the present invention there is provided a closure for a container which comprises a cap and a locking ring; the cap being adapted in use to sealably engage the opening of the outlet neck of a container ; and the locking ring being adapted in use to be mounted over the outlet neck of said container and slidable between first and second positions, such that in use in the first position, the locking ring engages said cap and thereby prevents disengagement of said cap from said opening of said container and in the second position, the locking ring is (a) disengaged from said cap thereby allowing said cap to disengage the opening of said outlet neck and (b) retained in the second position on the outlet neck of said container.

One advantage of the present invention is that the position of the locking ring can provide visible evidence of whether the closure has been at least partially disengaged from the container. A further advantage of the present invention is that the locking ring is retained in the second position on the outlet neck of the container thereby deterring and/or impeding replacement of the closure on the container with a new or alternative closure. These advantages have the benefit of deterring counterfeiters and also deterring or hindering unauthorised re-use of the container in combination with a new or alternative closure. However, once the locking ring and cap have been disengaged, the cap may still be re-engaged with the container without re-engaging the locking ring, thereby allowing authorised re-use of the container.

Preferably, the cap has a screw thread which in use, co-operates with a corresponding screw thread on the outlet neck of the container. The cap may sealably engage and disengage the opening of the outlet neck by screwing and unscrewing respectively the cap. The ability of the cap to screw and unscrew is however determined by the position of the locking ring. Thus, when the locking ring is in the first (locking) position, the locking ring engages the cap and prevents it from being unscrewed from the container; in the second (unlocked) position the locking ring is disengaged from the cap thereby allowing it to be unscrewed from the container.

The locking ring may engage and disengage the cap by means of one or more co-operating locking lugs and recesses. Thus, the cap may have one or more locking lugs which are adapted to engage corresponding locking recesses of the locking ring. Alternatively, the cap may have one or more locking recesses which are adapted to engage corresponding locking lugs of the locking ring. With more than one locking lug and corresponding locking recesses, the cap may have one or more locking lugs and one or more locking recesses and the locking ring may have one or more corresponding locking recesses and lugs.

Preferably, the locking ring has one or more, preferably two or more locking lugs. Typically, the locking ring has from 2 to 24 locking lugs, preferably from 2 to 16 locking lugs, for example 4 or 6 locking lugs. The cap has a corresponding number of locking recesses.

Preferably, the cap has a tubular part which in use, engages the neck of the container and more preferably, the cap has locking recesses in the form of longitudinal slots in the tubular part.

More preferably, the cap has a tubular part which has a screw thread which in use, co-operates with a corresponding screw thread on the outlet neck of the container. Preferably, the tubular part has a screw thread on its inner surface which co-operates with a corresponding screw thread on the outer surface of the outlet neck of the container (so-called, "screw-on cap"). Alternatively, the tubular part has a screw thread on its outer surface which co-operates with a corresponding screw thread on the inner surface of the outlet neck of the container (so-called, "screw-in cap"). Subject to the slidable position of the locking ring, the cap may sealably engage and disengage the opening of the outlet neck of the container by screwing and unscrewing respectively the

cap. In this embodiment, the tubular part preferably has one or more, typically, from 2 to 24 slots, preferably from 2 to 16 slots, for example 4 or 6 slots which in a first slidable position of the locking ring, engage corresponding locking lugs on the locking ring and thereby prevent disengagement of the cap from the opening of the container. With the locking ring in the second slidable position, the slots of the cap are disengaged from the locking lugs of the locking ring thereby allowing the cap to be unscrewed and disengage the opening of the outlet neck of the container.

The cap may be manufactured of one or more plastics materials. Suitably, the plastics material may comprise a thermoplastic polymer, for example comprising polypropylene homopolymer and/or copolymer. A suitable polypropylene copolymer may be a propylene/ethylene copolymer, for example containing 5 – 15 % polyethylene. The cap may be manufactured using injection moulding or compression moulding.

The cap may be manufactured of one or more differently coloured plastics materials.

The cap may be manufacturer from more than one plastics material, for example from a thermoplastics material and a thermoplastic elastomer material. The thermoplastic elastomer material may be flexible and thereby assist in sealing the cap against the neck of the container. Suitable thermoplastic elastomer materials may comprise thermoplastic rubber and/or semi rubber materials. A suitable thermoplastic rubber material is Santoprene® available from Advanced Elastomeric Systems or equivalent. Suitably, the cap may comprise 10 – 40 % by weight thermoplastic elastomer material. The cap may be manufactured from more than one plastics material by sequential co-injection moulding for example in which a first plastics material (e.g. polypropylene thermoplastic copolymer) is injected into a mould which is then rotated and then a second plastic material (e.g. thermoplastic rubber material) is injected into the mould.

The cap may be moulded to include a trade mark, logo or other distinguishing feature. The cap may printed and/or labelled with a trade mark, logo or other distinguishing feature. The printing may be uv printing. The labelling may be external or mould labelling. These have an advantage of further deterring counterfeiting. The cap may be of a single colour or multi-coloured. The trademark, logo or other

distinguishing feature may of the same colour and/or material as the rest of the cap or a different colour and/or material as the rest of the cap.

The cap may also comprise a wag, which is an insert of flexible material which in use, sealably engages the outlet of the container. The wag may comprise a flexible membrane. The wag may comprise more than one layer. Suitably the wag comprises a layer of polyethylene foam and a layer of aluminium. The layer of aluminium may be inductive sealed to the outlet of the container and may further have a trade mark, logo or other distinguishing feature thereon.

An advantage of a screw-in type cap is that it may not require a wag.

The locking ring is adapted in use to be mounted over the outlet neck of said container and slidable between first and second positions.

Preferably, the locking ring has one or more outer lugs by which it may be slid from the first to the second position thereby disengaging it from the cap and allowing the cap to disengage the opening of the outlet neck. Typically, the locking ring has from 2 to 24 outer lugs, preferably from 2 to 8 outer lugs, for example 4 or 6 outer lugs.

The locking ring is adapted to be retained in the second position on the outlet neck of the container when in use, it has been slidably moved to the second position. This has an advantage that the locking ring when retained in the second position on the outlet neck of the container can deter and/or impede replacement of the closure on the container with a new or alternative closure. Furthermore, this has a benefit of deterring counterfeiters and also deterring or hindering unauthorised re-use of the container in combination with a new or alternative closure. Thus, although closures are known which comprise a cap having a retaining ring which is frangibly connected to the cap and disengaged therefrom by unscrewing the cap, when the cap and ring are disengaged, the rings of such closures are not retained by the outlet neck but are loose fitting and therefore relatively easy to remove. The closure of the present invention however, has a locking ring which is retained in the second position on the outlet neck of the container, making it harder to remove and thereby providing an advantageous deterrence and impediment to replacement of the closure on the container with a new or alternative closure as well as deterring and hindering un-authorised re-use of the container with a new or alternative closure. However, once the locking ring and cap have been

disengaged, the cap may still be re-engaged with the container without re-engaging the locking ring, thereby allowing authorised re-use of the container.

Preferably, the locking ring may be adapted to be retained in the second position by one or more co-operating retaining lugs and retaining recesses. Thus, the locking ring may have one or more retaining lugs which are adapted to engage corresponding retaining recesses of the outlet neck of the container. Alternatively, the locking ring may have one or more retaining recesses which are adapted to engage corresponding retaining lugs of the outlet neck of the container. With more than one retaining lug and corresponding retaining recesses, the locking ring may have one or more retaining lugs and one or more retaining recesses and the container may have one or more corresponding retaining recesses and retaining lugs.

Preferably, the locking ring has one or more, preferably two or more retaining recesses. Typically, the locking ring has from 2 to 24 retaining recesses, preferably from 2 to 16 retaining recesses, for example 4 or 6 retaining recesses. The container has a corresponding number of retaining lugs.

When the locking ring is slid to the second position this may expose a logo or other distinguishing feature on the cap and/or container which may indicate that the closure has been used.

When the locking ring is in the first position and engaged with the cap, the retaining recesses and retaining lugs may be at least partially engaged thereby preventing the cap from being unscrewed from the container.

The locking ring of the present invention when in the first position and engaged with the cap, helps prevent leakage of material out from the container and/or contamination of the material in the container with contaminants passing into the container.

Preferably, the locking ring has retaining lugs and/or retaining recesses on a flexible part of the ring, which when the locking ring is slidably moved into the second position flexes to allow the retaining recesses and corresponding lugs to engage, hereby retaining the locking ring in the second position. The flexible part of the locking ring may be manufactured of one or more thermoplastic elastomer materials. Suitable thermoplastic elastomer materials may comprise thermoplastic rubber and/or semi

rubber materials. A suitable thermoplastic rubber material is Santoprene® available from Advanced Elastomeric Systems or equivalent.

The locking ring may be manufactured of one or more plastics materials. Suitably, the plastics material may comprise a thermoplastic polymer, for example comprising polypropylene homopolymer and/or copolymer. A suitable polypropylene copolymer may be a propylene/ethylene copolymer, for example containing 5 – 15 % polyethylene.

The locking ring may be manufactured using injection moulding or compression moulding.

The locking ring may be manufactured of one or more differently coloured plastics materials.

The locking ring may be manufacturer from more than one plastics material, for example from a thermoplastics material and a thermoplastic elastomer material. The thermoplastic elastomer material may be flexible and thereby assist in sealing the closure against the outlet neck of the container. Suitable thermoplastic elastomer materials may comprise thermoplastic rubber and/or semi rubber materials. A suitable thermoplastic rubber material is Santoprene® available from Advanced Elastomeric Systems or equivalent. The locking ring may be manufactured from more than one plastics material by sequential co-injection moulding for example in which a first plastics material (e.g. polypropylene thermoplastic copolymer) is injected into a mould which is then rotated and then a second plastic material (e.g. thermoplastic rubber material) is injected into the mould.

An advantage of using thermoplastic elastomeric materials for at least part of the locking ring, is that these may impart a non-slip feel, especially to the outer lugs, facilitating pushing of the locking ring from the first to the second positions to open the closure, especially if the person opening the closure has wet or oily hands.

Thus, the following terms are used herein as followings :

locking lugs and recesses : lugs and recesses by which the locking ring and cap may engage and disengage;

outer lugs : lugs by which the locking ring may be slid from the first to the second position;

retaining lugs and recesses : lugs and recesses by which the locking ring is retained in its second position on the outlet neck of the container;

The container may be any suitable container having an outlet neck and opening therein. The container is preferably suitable for containing liquids. Typically, the container is suitable for containing liquids such as lubricating oils especially automotive lubricating oils, e.g. hydrocarbon or synthetic lubricating oils. The container is also suitable for containing liquids such as harmful or dangerous chemicals such as fuel additives, anti-freeze compositions, brake fluids and the like.

Preferably, the container is manufactured of plastics material. The plastics material may comprise one or more polyolefins, optionally in combination with other polymers. Suitable polyolefins include high density polyethylene and polypropylene. The container may be of one or more colours. The container may be labelled and/or printed (for example uv printed). Suitable containers range in size from 100 ml. to 50 litres, for example 100ml, 250 ml, 1litre, 5 litre and 7.5 litre bottles and 15 litre, 20 litre and 50 litre drums.

The closure and container may be printed and/or labelled with batch numbers and/or other identification marks, for example with part of the number and/or mark on the closure and the remaining part on an adjacent part of the container.

The invention will now be described by way of example only and with reference to Figures 1 to 6 in which Figure 1 represents general disassembled view, a cap and a locking ring according to the present invention, Figure 2 represents general assembled view, a cap and a locking ring according to the present invention, Figure 3 represents in general view, a container with a closure according to the present invention with the cap sealing the opening of the container's outlet neck and with the locking ring in the first slidable position, Figure 4 represents in general view, a container with a closure according to the present invention with the locking ring in the second slidable position, Figure 5 represents in general view, a container with a closure according to the present invention with the locking ring in the second slidable position and the cap disengaging the opening of the container's outlet neck and Figure 6 represents in general view, a container with a closure according to the present invention with the locking ring in the

second slidable position and the cap having been removed from the opening of the container's outlet neck.

Referring to the drawings, the closure of the present invention comprises a cap (1) and a locking ring (2); the cap (1) being adapted in use to sealably engage the opening (3) of the outlet neck (4) of a container (5); and the locking ring (2) being adapted in use to be mounted over the outlet neck (4) of the container (5) and slidable between first and second positions, such that in use in the first position, the locking ring (2) engages said cap (1) and thereby prevents disengagement of the cap (1) from the opening (3) of the container (5) and in the second position, the locking ring (2) is disengaged from the cap (1) thereby allowing said cap (1) to disengage the opening (3) of the outlet neck (4).

The cap may be manufacturer from more than one plastics material, for example from a thermoplastics material and a thermoplastic elastomer material. The thermoplastic elastomer material may be flexible and thereby assist in sealing the cap against the outlet neck of the container. Part (20) of the cap may be of a thermoplastic elastomer material which may facilitate improved grip, especially if the user has wet or oily hands. The cap may be manufactured from more than one plastics material by sequential co-injection moulding for example in which a first plastics material (e.g. polypropylene thermoplastic copolymer) is injected into a mould which is then rotated and then a second plastic material (e.g. thermoplastic rubber material) is injected into the mould.

The cap is manufactured with a trade mark (11). The cap (1) has a tubular part (6) which has a screw thread (7) which in use, co-operates with a corresponding screw thread (8) on the outlet neck (4) of the container (5). Subject to the slidable position of the locking ring (2), the cap (1) may sealably engage and disengage the opening (3) of the outlet neck (4) of the container (5) by screwing and unscrewing respectively the cap (1).

The cap has a wag insert (21) comprised of a layer of polyethylene foam and a layer of aluminium, the latter may be conductive sealed to the outlet of the container.

The tubular part (6) has locking recesses in the form of slots (9) which in a first slidable position of the locking ring (shown generally in Figure 3), engage corresponding locking lugs (10) on the locking ring (as shown in Figure 2) and thereby prevent disengagement of the cap from the opening (3) of the container (5). With the

locking ring in the second slidable position as shown generally in Figure 4, the slots (9) of the cap are disengaged from the locking lugs (10) of the locking ring thereby allowing the cap to be unscrewed (as shown generally in Figure 5) and disengage the opening of the outlet neck of the container, as shown generally in Figure 6.

The locking ring has 4 outer lugs (12) which may be used to slide the locking ring from the first to the second positions.

The locking ring has 4 retaining recesses (13) (shown in Figures 1 and 2) which engage corresponding retaining lugs (14) on the outlet neck of the container (shown in Figure 3) when the locking ring is slidably moved (as shown in Figure 4) to the second position.

The retaining recesses (13) of the locking ring (2) are on a flexible part (15) of the ring (shown in Figure 2) which, when the locking ring is slidably moved into the second position, flexes to allow the retaining recesses (13) and corresponding retaining lugs (14) to engage, hereby retaining the locking ring (2) in the second position on the outlet neck of the container (shown generally in Figures 5 and 6). The flexible part (15) of the locking ring may be manufactured of one or more thermoplastic elastomer materials. Suitable thermoplastic elastomer materials may comprise thermoplastic rubber and/or semi rubber materials. A suitable thermoplastic rubber material is Santoprene® available from Advanced Elastomeric Systems. The locking ring (2) may be manufactured of one or more plastics materials. The locking ring may be manufactured from more than one plastics material by sequential co-injection moulding for example in which a first plastics material (e.g. polypropylene thermoplastic copolymer) is injected into a mould which is then rotated and then a second plastic material (e.g. thermoplastic rubber material) is injected into the mould.

When the locking ring (2) is in the first position and engaged with the cap (1), the retaining recesses (13) and retaining lugs (14) may be at least partially engaged thereby preventing the cap from being unscrewed from the container.

In use, the container is sealed by the cap and the locking lugs (10) of the locking ring (2) engage the locking recesses (slots) (9) on the tubular part of the cap (1) as shown generally in Figure 3. To remove the cap and open the container, the locking ring is slidably moved to the second position by pressing down on one or more of the outer lugs (12) on the locking ring (2) as shown generally in Figure 4. This disengages

the slots (9) on the cap (1) and the locking lugs (10) on the locking ring (2). The locking ring is also moved slidably down the outlet neck of the container so that the retaining recesses (13) on the flexible part (15) of the locking ring (2) engage the corresponding retaining lugs (14) on the outlet neck of the container and retain the locking ring in the second position. This has an advantage that the locking ring when retained in the second position can deter and/or impede replacement of the closure on the container with a new or alternative closure. Furthermore, this has a benefit of deterring counterfeiters and also deterring or hindering unauthorised re-use of the container in combination with a new or alternative closure.

When the locking ring is in the second position as shown in Figures 4 to 6, the locking lugs (10) and slots (9) are disengaged and the cap (1) is free to be unscrewed from the outlet neck of the container, as shown generally in Figure 5. The cap may thus be disengaged from the opening (3) of the outlet neck (4) of the container (5) and removed, whilst the locking ring (2) is retained on the outlet neck of the container, as shown in Figures 5 and 6.

The container as shown in the drawings may be used for liquids. Typically, the container is suitable for containing liquids such as lubricating oils especially automotive lubricating oils, e.g. hydrocarbon or synthetic lubricating oils. The container is also suitable for containing liquids such as harmful or dangerous chemicals such as fuel additives, anti-freeze compositions, brake fluids and the like.